GYRO

SWIVEL OCTOPUS

SERVICE PROCEDURE

This Service Procedure conveys lists of components and service procedures that reflect the GYRO Swivel Octopus as it was configured at the time of the writing (3/24/03).

It also contains Supplemental Information intended to assist the Authorized AERIS Service Technician who is servicing a GYRO Swivel Octopus that may be configured with older components.

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Product Service Manual
Doc. No. 12-7527-r01 (3/24/03)

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REGULATOR GENERAL PROCEDURES

REFER TO ..... **DOC. 12-7508**

SPECIFICATIONS

Torques

P/N 30.96725 Swivel Fitting	85 to 95 in-lbs
P/N 30.96726 Swivel Retainer	35 to 45 in-lbs
LP Hose	50 to 60 in-lbs

Opening Effort (IP = 140 psi)

Recommended	= 1.5 to 2.0 inches of H_2O.
Acceptable	= 1.5 to 2.2 inches of H_2O.

TOOLS REQUIRED

Standard Tools

Inch pounds Torque Wrench
5/8” Open End Wrench
3/4” Open End Wrench
11/16” Open End Wrench
1/4” Nut Driver
1/8" Allen Key
3/16" Allen Key
3/4" Deep Wall Socket
1" Deep Wall Socket

Specialty Tools

P/N 30.02302	Christo-Lube MCG111 - 2 oz
P/N 30.03367	Poppet Tool
P/N 30.09315	Intermediate Pressure Gauge
P/N 30.09520	O-ring Tool Kit
P/N TBD	Front Cover Tool

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TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
*** Freeflow or leakage present.**	1. LEVER ARM (23) bent. 2. Excessive intermediate pressure. 3. Damaged or worn POPPET SEAT (19). 4. Damaged ORIFICE (18). 5. LOCK NUT (25) overtightened onto POPPET (20) shaft. 6. WASHER (22) bent or distorted. 7. ORIFICE (18) incorrectly adjusted. 8. POPPET SPRING (21) worn or weakened. 9. SWIVEL FITTING (15) not sufficiently tightened into HOUSING (5) Inlet Tube. 10. Trapped debris.	1. Replace with new. 2. Refer to First Stage Troubleshooting Chart. 3. Replace with new. 4. Replace with new. 5. Replace with new and readjust. (Refer to tuning section.) 6. Replace WASHER (22), SPACER (24), and LOCK NUT (25) with new. 7. Turn in, clockwise, to adjust. (Refer to tuning section.) 8. Replace with new. 9. Follow correct procedure given in Reassembly Section to tighten. 10. Remove and clean.
*** Excessive inhalation resistance.**	1. LOCK NUT (25) overtightened onto POPPET (20) shaft, causing excessive POPPET SPRING (21) tension. 2. LOCK NUT (25) insufficiently tightened onto POPPET (20) shaft, causing LEVER ARM (23) slack. 3. LEVER ARM (23) bent. 4. ORIFICE (18) incorrectly adjusted. 5. Insufficient intermediate pressure from First Stage.	1. Replace with new and readjust. (Refer to tuning section.) 2. Tighten to correct Spring load and Lever height. (Refer to tuning section.) 3. Replace with new. 4. Adjust to correct contact. (Refer to tuning.) 5. Refer to First Stage Troubleshooting Chart.
*** Rattle heard inside Second Stage.**	1. Gravel or sand trapped inside HOUSING (5). 2. LEVER ARM (23) slack present.	1. Remove and clean. 2. Tighten LOCK NUT (22) onto POPPET (20) Shaft. (Refer to tuning section.)
*** Little or no airflow when Purge Button is depressed.**	1. FRONT COVER (1/2) not sufficiently tightened into HOUSING (5). 2. LEVER ARM (23) slack present. 3. LEVER ARM (23) bent. 4. ORIFICE (18) incorrectly adjusted.	1. Tighten COVER RING (2) until secure. 2. Tighten LOCK NUT (25) onto POPPET (20) Shaft. (Refer to tuning section.) 3. Replace with new. 4. Adjust ORIFICE (18) to correct contact. (Refer to tuning section.)
*** Water entering Second Stage.**	1. Tear in MOUTHPIECE (9). 2. EXHAUST VALVE (7) distorted or damaged. 3. DIAPHRAGM (4) distorted or damaged. 4. Debris trapped beneath EXHAUST VALVE (7). 5. FRONT COVER (1, 2) insufficiently tightened onto HOUSING (5). 6. Cracked or damaged HOUSING (5).	1. Replace with new. 2. Replace with new. 3. Replace with new. 4. Remove and clean. 5. Tighten until secure and properly aligned. 6. Replace with new.

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DISASSEMBLY PROCEDURE

⚠ **NOTE: Be sure to perform the steps outlined in the Initial Inspection Procedures (Doc. 12-7508) prior to disassembling the Regulator. Review the Troubleshooting Section to gain a better idea of which internal parts may be worn, and to better advise your customer of the service that is needed.**

1. Snip the plastic TIE WRAP (8) that holds the MOUTHPIECE (9), and remove the MOUTHPIECE. Inspect the condition of the MOUTHPIECE to ensure that it is supple and free of any tears or corrosion. Discard if found.

2. Remove the Hose from the Second Stage using an 11/16" Open End Wrench, while holding the SWIVEL (14) secure with an 3/4" Open End Wrench (Fig. 1). Use care not to scratch the finish.

3. Remove the Front Cover Assembly (1, 2) using a Front Cover tool if necessary. DO NOT separate the PURGE BUTTON (1) and COVER RING (2) unless necessary.

4. Lift out the DIAPHRAGM WASHER (3), then grasp the DIAPHRAGM (4) by the raised edges of the Center, and lift with a slight upward twist to remove it. Inspect to ensure it is supple and free of any tears, corrosion, or distortion. Discard if found.

5. Remove the SWIVEL RETAINER (11) by turning it counter clockwise with a 1/4" Allen Key. Remove the SWIVEL RETAINER O-RING (12) using a brass O-ring Tool and inspect it for any signs of decay. Discard if found.

6. While holding the HOUSING (5) secure, pull the SWIVEL (14) straight off the SWIVEL FITTING (15). Use a twisting/pulling motion to overcome O-ring resistance (Fig. 2). Inspect the FITTING to ensure that it is free of nicks or burrs.

7. Depress and hold the LEVER ARM (23) while removing the SWIVEL FITTING (15) in a counter clockwise direction, using a 3/4" modified deep wall socket (Fig. 3).

⚠ **CAUTION: DO NOT attempt to remove the SWIVEL FITTING by inserting any type of tool through the machined openings.**

8. Remove the HOUSING INLET O-RING (16) and 2 SWIVEL FITTING O-RINGS (13) from the SWIVEL FITTING (15) and inspect for any signs of decay. Discard if found.

9. Remove the ORIFICE (18) from the SWIVEL FITTING (15) by inserting a 3/16" Allen Key in from the Swivel End of the FITTING until it engages in the ORIFICE, then turn it clockwise (out) until it disengages completely from the Threads (Fig. 4).

   Use caution to avoid nicking or scratching the delicate knife edge of the ORIFICE as this is done.

Fig. 1

Fig. 2

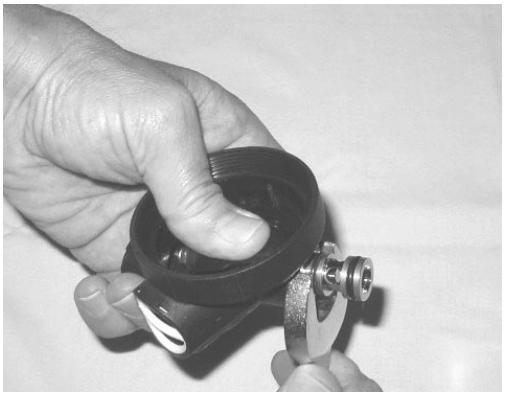

Fig. 3

Fig. 4

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10. Remove and discard the ORIFICE O-RING (17). Inspect the ORIFICE (18) carefully with the use of a magnifier to ensure that it is perfectly free of any scoring or nicks. If found, discard and DO NOT attempt to reuse it.

11. Hold the POPPET (20) secure with a Poppet Tool and using a 1/4" nut driver inserted through the Mouthpiece opening of the HOUSING (5), turn the LOCK NUT (25) counterclockwise until no Threads are showing (Fig. 5).

12. Using the Poppet Tool, push the POPPET (20) inward in the Inlet Tube of the HOUSING (5), compressing the POPPET SPRING (21), and carefully remove the LEVER ARM (23) (Fig. 6).

13. Remove the POPPET (20), POPPET SPRING (21), WASHER (22), SPACER (24), and LOCK NUT (25) by holding the POPPET secure with the Poppet Tool and turning the LOCK NUT counterclockwise using a 1/4" Nut Driver inserted through the Mouthpiece opening of the HOUSING (5).

14. Examine the SPACER (24) for deterioration. Discard if found. Discard the LOCK NUT (25) and WASHER (22), and DO NOT attempt to reuse them.

15. Examine the LEVER ARM (23) and compare with new to ensure that it is not bent or distorted in any way. Discard if found.

16. Examine the POPPET SPRING (21) with a magnifier and compare with new to ensure correct tension and length. Discard if found to be weakened or corroded.

17. Remove the POPPET SEAT (19) from the POPPET (20) with the use of a Dental Pick. Discard, and DO NOT attempt to reuse it.

18. Using a small blade Screwdriver or a thin plastic Probe inserted into the small Slots in the HOUSING (5), carefully press the upper (or lower) Retaining Tabs of the EXHAUST GUARD (6) (Fig. 7). Once the EXHAUST GUARD is disengaged, lift it out of the HOUSING. Repeat to remove the other EXHAUST GUARD.

19. Inspect the overall condition of the HOUSING (5), and the EXHAUST GUARD (6) to ensure they are free of any stress cracks or other distortions. Ensure that all threading on the HOUSING is in good condition. Discard either if any distortion or damage is found.

20. Using a soft Probe, inspect the condition of the EXHAUST VALVES (6) to ensure they are supple and free of any tears or corrosion, and that they seal completely around the Seating Surface(s) of the HOUSING (5).

△ **NOTE: If the EXHAUST VALVES (6) are in good condition, it is not necessary to remove them. The HOUSING (5) may be cleaned with them attached.**

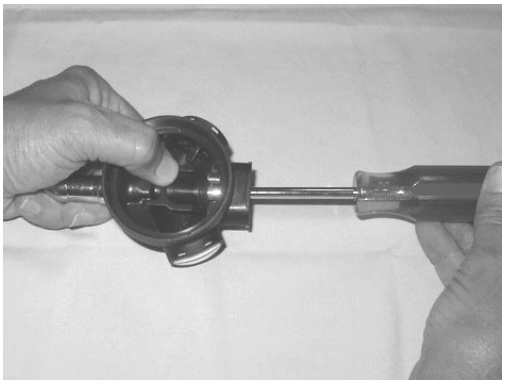

Fig. 5

Fig. 6

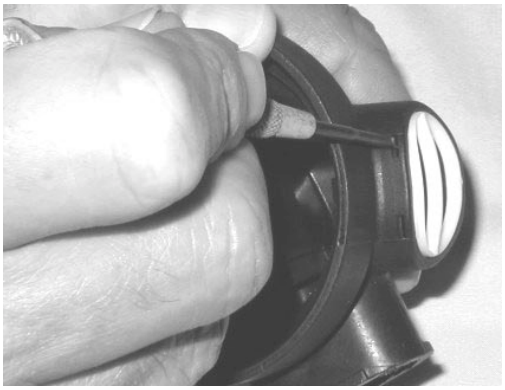

Fig. 7

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21. If an EXHAUST VALVE (7) requires replacement, it may be removed by grasping it at the Flange and pulling it straight out, snipping the Retainer Stem if necessary. Discard.

REASSEMBLY PROCEDURE

⚠ **NOTE: Prior to Reassembly, inspect all parts, both new and those that are being reused. Check to ensure that O-rings are clean and supple, and that every part and component has been thoroughly cleaned and dried.**

⚠ **WARNING: Use only genuine AERIS parts, subassemblies, and components whenever assembling AERIS products. DO NOT attempt to substitute an AERIS part with another manufacturer's, regardless of any similarity in shape, size, or appearance. Doing so may render the product unsafe, and could result in serious injury or death of the user.**

1. Replace the EXHAUST VALVE (7), if removed, into the HOUSING (5) by gently pulling the Retainer Stem through the HOUSING until the Retaining Flange is inside the HOUSING and properly seated. Repeat to install the other EXHAUST VALVE.

2. Replace the EXHAUST GUARD (6) into the HOUSING (5) by holding the GUARD at a slight angle to insert the lower Retaining Tabs into the slots in the HOUSING, then carefully pressing downward and inward on the top of the GUARD to insert the upper Retaining Tabs (Fig. 8).

   Ensure that all of the Retaining Tabs are properly engaged. Repeat to install the other EXHAUST GUARD.

3. Place a new POPPET SEAT (19) into the POPPET (20), with the Side that is perfectly smooth facing out. Ensure that it is completely seated, flush with the Rim of the POPPET. DO NOT use adhesive.

4. Apply a light film of Lubricant to each End of the POPPET SPRING (21) and place it onto the POPPET (20). Fit the POPPET into the Pronged End of the Poppet Tool and insert the POPPET Shaft completely through the Inlet Tube of the HOUSING (5) compressing the SPRING until the Threaded portion of the Shaft is completely visible inside the HOUSING.

   Hold in position by grasping the Tool with your fingers and the outer Rim of the HOUSING with your thumb (Fig. 9).

5. Place a new WASHER (22), then the SPACER (24), over the Threads of the POPPET (20) and onto the POPPET Shaft.

6. Using a 1/4" Nut Driver, turn the LOCK NUT (25) clockwise onto the POPPET Threads until no Threads are showing beyond the outer surface of the LOCK NUT (Fig. 10). Remove the tools.

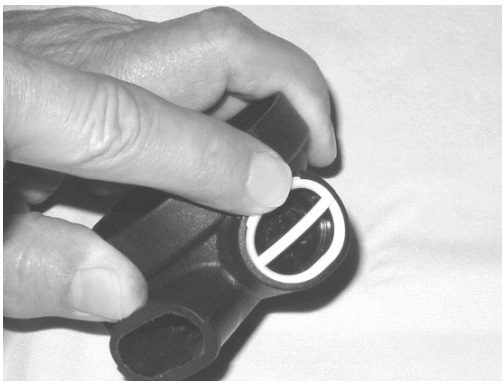

Fig. 8

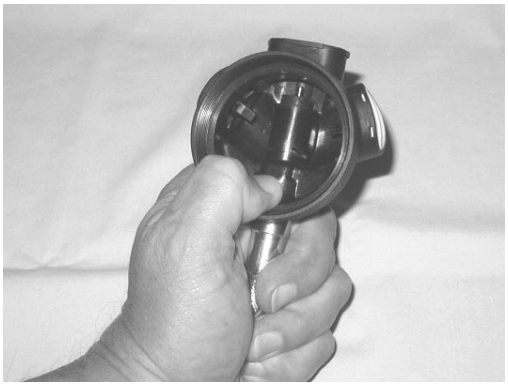

Fig. 9

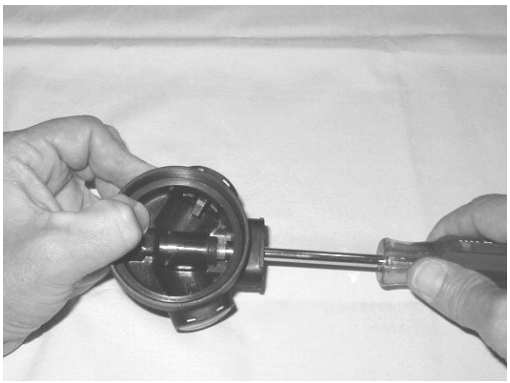

Fig. 10

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7. Using the Poppet Tool, push the POPPET (20) into the HOUSING (5) to expose the WASHER (22) and SPACER (24) inside the HOUSING. Place the Forks of the LEVER ARM (23) over the POPPET Shaft between the WASHER and the SPACER. Relax the POPPET and watch to ensure that the LEVER ARM is properly oriented (Fig. 11).

8. While holding the POPPET (20) secure with the Poppet Tool, use the 1/4" Nut Driver to turn the LOCK NUT (25) clockwise onto the POPPET Threads until 2 Threads are showing beyond the outer surface of the LOCK NUT (Fig. 12). Relax the POPPET and watch to ensure that the LEVER ARM stands upright. Remove the tools.

9. Lubricate and install the HOUSING INLET O-RING (16) onto the Threaded end of the SWIVEL FITTING (15).

10. Lubricate and install a new ORIFICE O-RING (17) onto the ORIFICE (18). Lubricate the Threads of the ORIFICE with a very thin film of Lubricant. Insert a 3/16" Allen Key through the Barrel of the SWIVEL FITTING (15) from the Swivel End so it protrudes out the Threaded End.

⚠ **CAUTION: Be careful to protect the delicate knife edge of the ORIFICE.**

11. Place the ORIFICE (18) onto the 3/16" Allen Key and thread it counter clockwise into the SWIVEL FITTING (15) until the Rim of the ORIFICE is flush with the outer edge of the SWIVEL FITTING (Fig. 13). DO NOT overtighten. Remove the tool.

12. Depress and hold the LEVER ARM (23) and thread the SWIVEL FITTING (15) into the Inlet Tube of the HOUSING (5), then tighten clockwise with a 3/4" Deep Wall Socket **to a torque of 85 to 95 in/lbs**.

△ **NOTE: For best sensitivity of touch during Step #13, place your finger gently on the LOCK NUT (25) while slowly turning the ORIFICE (18). As soon as contact is made, you will feel the LOCK NUT begin turning.**

13. Insert a 3/16" Allen Key through the Barrel of the SWIVEL FITTING (15) until it engages in the ORIFICE (18) (Fig. 14), then gently turn the ORIFICE clockwise until the Knife Edge is barely contacting the POPPET SEAT (19).

⚠ **CAUTION: DO NOT continue to turn the ORIFICE any further beyond this point. Doing so will cause the LEVER ARM (23) to drop, damaging the POPPET SEAT, that will then have to be replaced.**

Fig. 11

Fig. 12

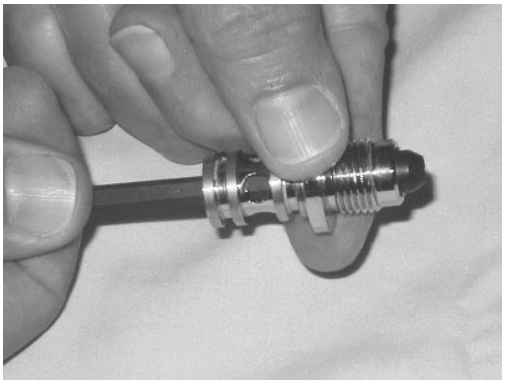

Fig. 13

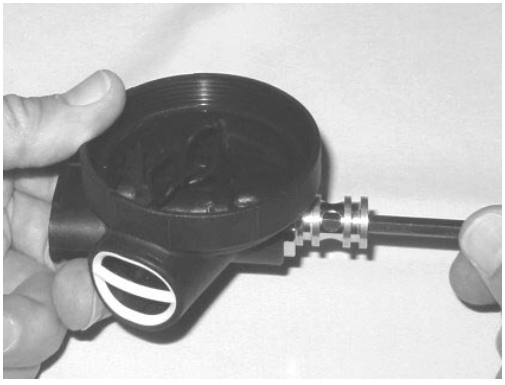

Fig. 14

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14. Lubricate and install the 2 SWIVEL FITTING O-RINGS (13) into the Grooves of the SWIVEL FITTING (15).

NOTE: One end of the SWIVEL (14) is slightly larger than the other (Fig. 15).

15. Slide the SWIVEL (14), larger end first, straight onto the SWIVEL FITTING (15). Ensure that it rotates freely through 180 degrees.

16. Lubricate and install the SWIVEL RETAINER O-RING (12) onto the SWIVEL RETAINER (11).

17. Thread the SWIVEL RETAINER (11) clockwise into the SWIVEL FITTING (15) and tighten **to a torque of 35 to 45 in/lbs**.

18. Place the DIAPHRAGM (4) inside the HOUSING (5) with the Raised Center facing up, and ensure that it seats flush at the Base of the Inner Threads.

19. Lay the DIAPHRAGM WASHER (3) on the DIAPHRAGM (4), and ensure that it positioned evenly.

20. Position the FRONT COVER ASSEMBLY (1, 2) onto the HOUSING (5), taking care to ensure that it is correctly seated on the Threads. Hand tighten by turning it clockwise until secure. Use the Front Cover Tool, if necessary. DO NOT over tighten.

22. Secure the MOUTHPIECE (9) onto the HOUSING (5) with a TIE WRAP (8), positioning the Locking Tab of the TIE WRAP towards the lower/left position.

23. Lubricate and replace the O-ring inside the Second Stage Coupling End of the LP Hose. Install the Hose onto the Second Stage SWIVEL, and tighten **to a torque of 50 to 60 in/lbs** with an 11/16" Open End Wench, while holding the SWIVEL (14) secure with an 3/4" Open End Wrench (Fig. 16). Use care not to scratch the finish.

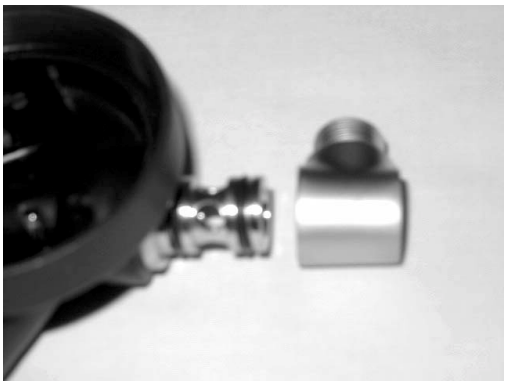

Fig. 15

Fig. 16

TUNING AND TESTING

FIRST STAGE TESTING

1. Perform the Leak Detection Test specified in the Initial Inspection Procedure (Doc. no. 12-7508).

NOTE: Refer to the Trouble Shooting Section (page 3) to determine the possible cause and treatment of any Air leaks that may be found.

2. Connect the GYRO Second Stage LP Hose to a Low Pressure Port of the First Stage. Ensure that all other Ports are sealed with Port Plugs, with the exception of an additional Low Pressure Quick Disconnect Hose.

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3. Connect a recently calibrated Low Pressure Test Gauge to the additional Low Pressure Hose, and connect the First Stage to a pure Air source of 3,000 PSI (206 BAR).

4. Slowly open the valve to pressurize the Regulator, and check the Test Gauge to ensure that the Intermediate Pressure is set as recommended in the Specifications for the First Stage used.

⚠ **NOTE: If the Intermediate Pressure is found to be other than that specified, refer to that First Stage's Trouble Shooting Section to determine possible cause and treatment.**

TUNING

1. Prior to tuning the GYRO, verify the following:

   A. All components are securely installed into the HOUSING (5).

   B. The MOUTHPIECE (9) has been cleaned and disinfected.

2. Pressurize the Regulator with a pure Air source of 3,000 PSI (206 BAR) and listen to determine that no airflow is present.

⚠ **NOTE: An In-Line Adjustment Tool cannot be used to tune the GYRO while it is pressurized. If adjustment is required, it must be depressurized to allow the SWIVEL RETAINER (11) to be removed to gain access to the ORIFICE (18). The LP Hose does not have to be removed.**

⚠ **CAUTION: To avoid cutting the POPPET SEAT (19) with the knife edge of the ORIFICE (18), always depress the Purge Button while turning the ORIFICE in or out.**

3. To tune the GYRO, use a 3/16" Allen Key to turn the ORIFICE (18) (Fig. 17) as necessary to achieve the desired Opening Effort.

   Clockwise turns the ORIFICE out toward the POPPET SEAT (19), increasing the Opening Effort.

   Counter clockwise turns the ORIFICE in, away from the SEAT, reducing the Opening Effort.

   Use the flat side of the Allen Key as a guide to small fractional 1/12 (30 degree) turns.

⚠ **CAUTION: Turning the ORIFICE (18) out further than necessary to stop airflow could cut the POPPET SEAT (19).**

4. Replace the SWIVEL RETAINER (11), pressurize the Regulator, and listen carefully for Air flow or leakage.

Fig. 17

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5. Hold the Second Stage with the MOUTHPIECE (9) facing directly down, and gently shake it up and down. Listen carefully for any rattle that may be present, indicating LEVER ARM (23) slack.

   If a rattle is found, perform the following procedure:

   A. Purge the Regulator of pressure.

   B. Perform Disassembly Procedure Steps #2 through #8 to gain access to the POPPET (20). DO NOT remove O-rings or discard parts.

   C. Using a 1/4" Nut Driver, turn the LOCK NUT (25) clockwise further onto the POPPET (20) Shaft with small fractions of a turn, while holding the POPPET secure using the Poppet Tool.

   D. Use the correct method given in Steps #12, #15, and #17 through #20 of the Reassembly Procedure to replace the SWIVEL after each adjustment, and again determine whether slack is eliminated.

⚠ **NOTE: Avoid tightening the LOCK NUT (25) any further than is necessary to eliminate LEVER ARM (23) slack. It may be necessary to repeat Step #5 several times to arrive at the correct setting.**

⚠ **CAUTION: Be careful to avoid over adjusting! If Air flow returns, replace the LOCK NUT (25) and POPPET SEAT (19) with new, and start over after rereading the above Procedures.**

6. Inhale lightly through the MOUTHPIECE (9) to determine that Air flows easily and smoothly, without any hesitation or lag.

⚠ **NOTE: If hesitation or lag is detected, refer to the Trouble Shooting Section (page 3) to determine possible cause and treatment.**

7. Clean and disinfect the MOUTHPIECE (9) in warm, soapy water before returning the Swivel Octopus to the customer.

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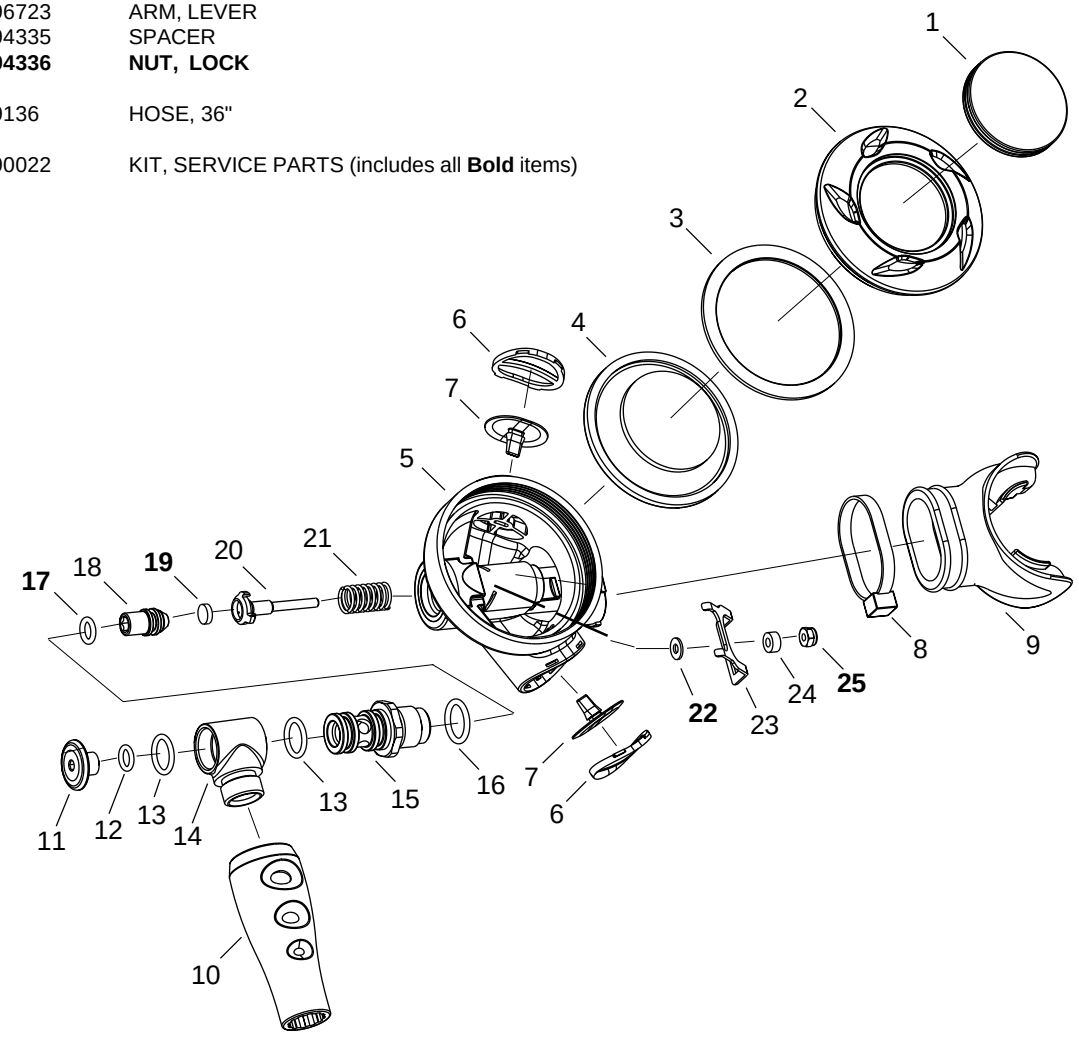
Dia. No.	Part No.	Description
1c	30.96739	BUTTON, PURGE
2c	30.96741	RING, COVER
3b	30.96381	WASHER, DIAPHRAGM
4b	30.96380	DIAPHRAGM
5c	30.96721	HOUSING (BK)
6c	30.96727	GUARD, EXHAUST
7b	30.96670	VALVE, EXHAUST
8c	30.91978.07	WRAP, TIE (BK)
9c	30.96651.07	MOUTHPIECE (BK)
10c	30.96738	PROTECTOR, HOSE
11c	30.96726	RETAINER, SWIVEL
12b	30.9902	O-RING, SWIVEL RETAINER
13b	30.9013	O-RING, SWIVEL FITTING
14c	30.96724	SWIVEL
15c	30.96725	FITTING, SWIVEL
16c	30.9906	O-RING, HOUSING INLET
17a	**30.9010**	**O-RING, ORIFICE**
18c	30.96730	ORIFICE
19a	**30.94340**	**SEAT, POPPET**
20c	30.94333	POPPET
21c	30.95074	SPRING, POPPET
22a	**30.95117**	**WASHER**
23c	30.96723	ARM, LEVER
24b	30.94335	SPACER
25a	**30.94336**	**NUT, LOCK**
N/S	30.9136	HOSE, 36"
N/S	30.90022	KIT, SERVICE PARTS (includes all **Bold** items)



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SUPPLEMENTAL INFORMATION

Due to design enhancements that have been made since the GYRO Octopus was released, the unit being serviced may not have the same components previously described.

The intent of this Supplemental Information is to assist the AERIS Regulator Service Technician with identification of previous component parts and provide guidelines for their reuse or replacement.

The exploded view diagram on page 11 can be used as a reference for older units.

Dia. Part No. 4 - DIAPHRAGM

current p/n 30.96380
Compatible with all other parts.

older p/n 30.96729
Replacement with the newer part is not required, but is allowed at your discretion.
Compatible with all other parts.

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